

Design Optimization

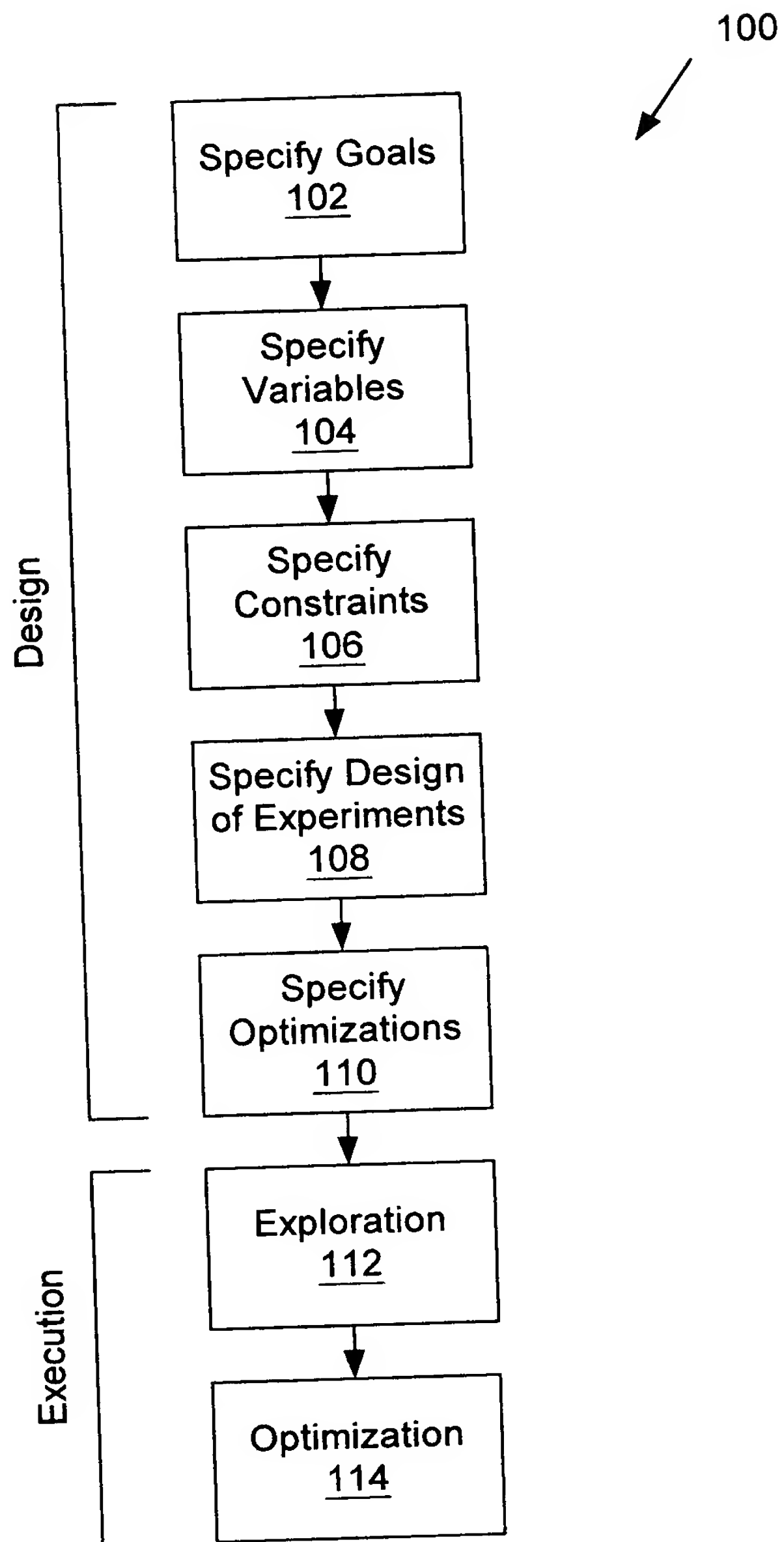


Figure 1 / 27

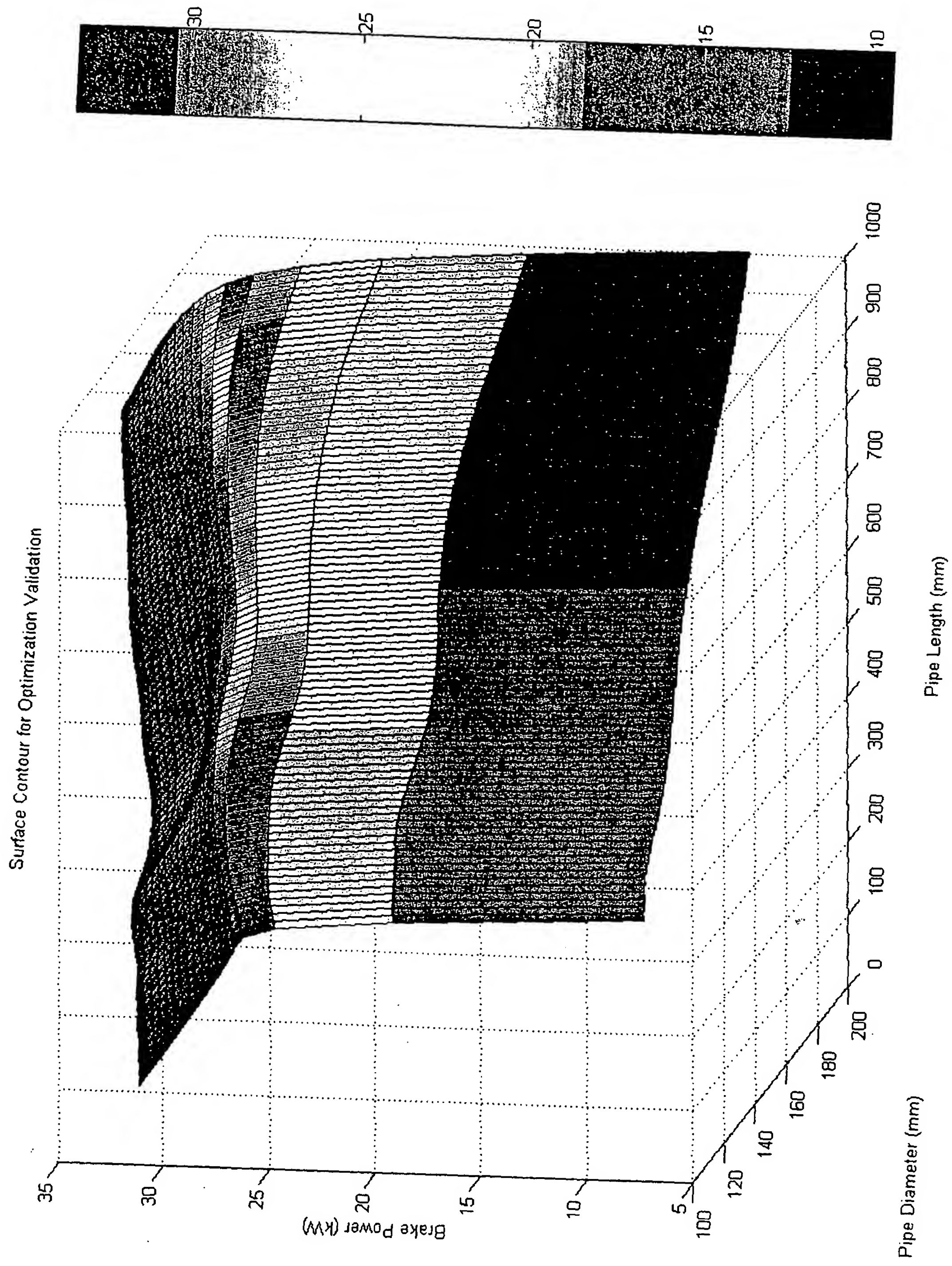


Figure 2

Exploration Value
Determination

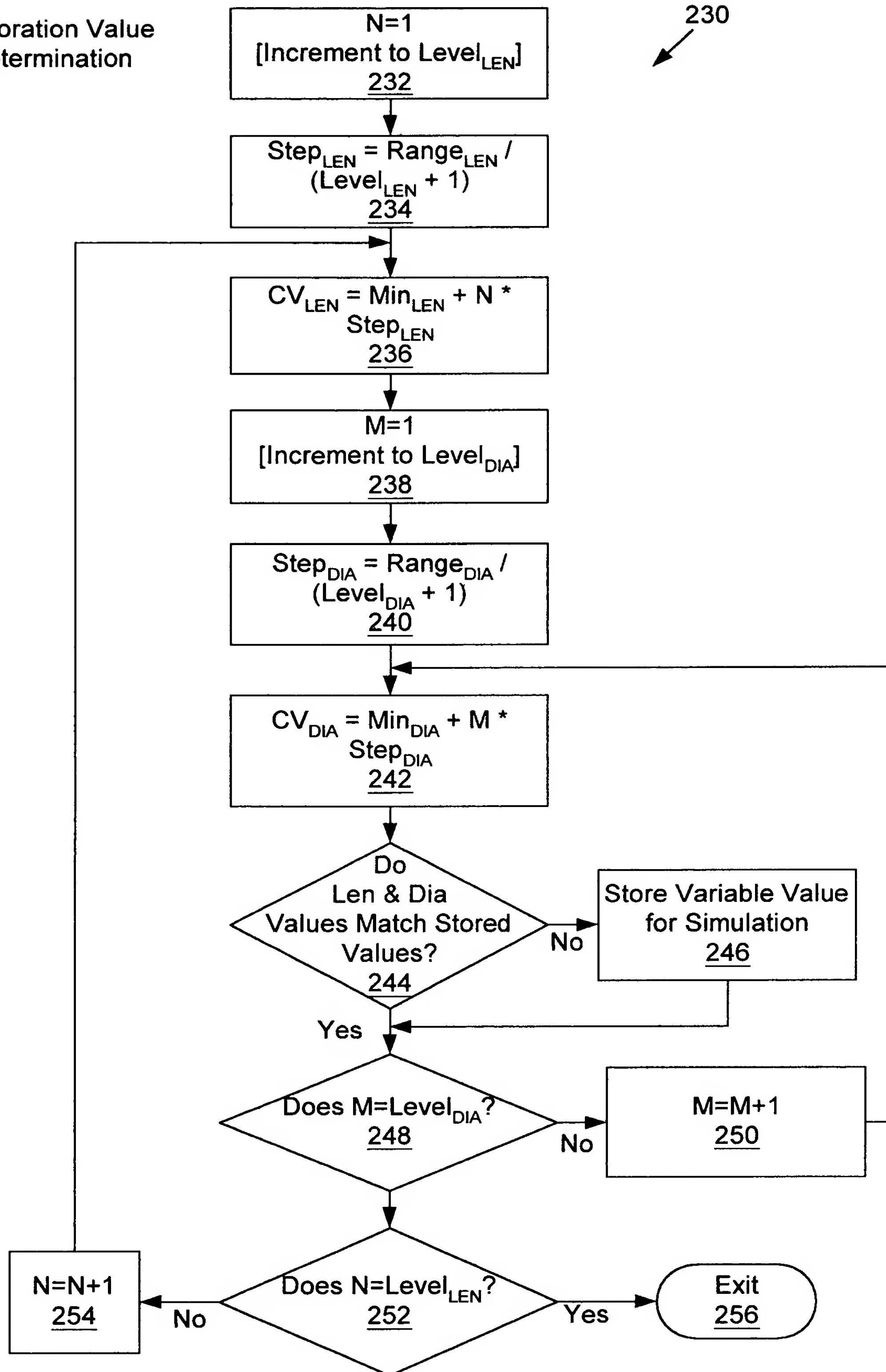
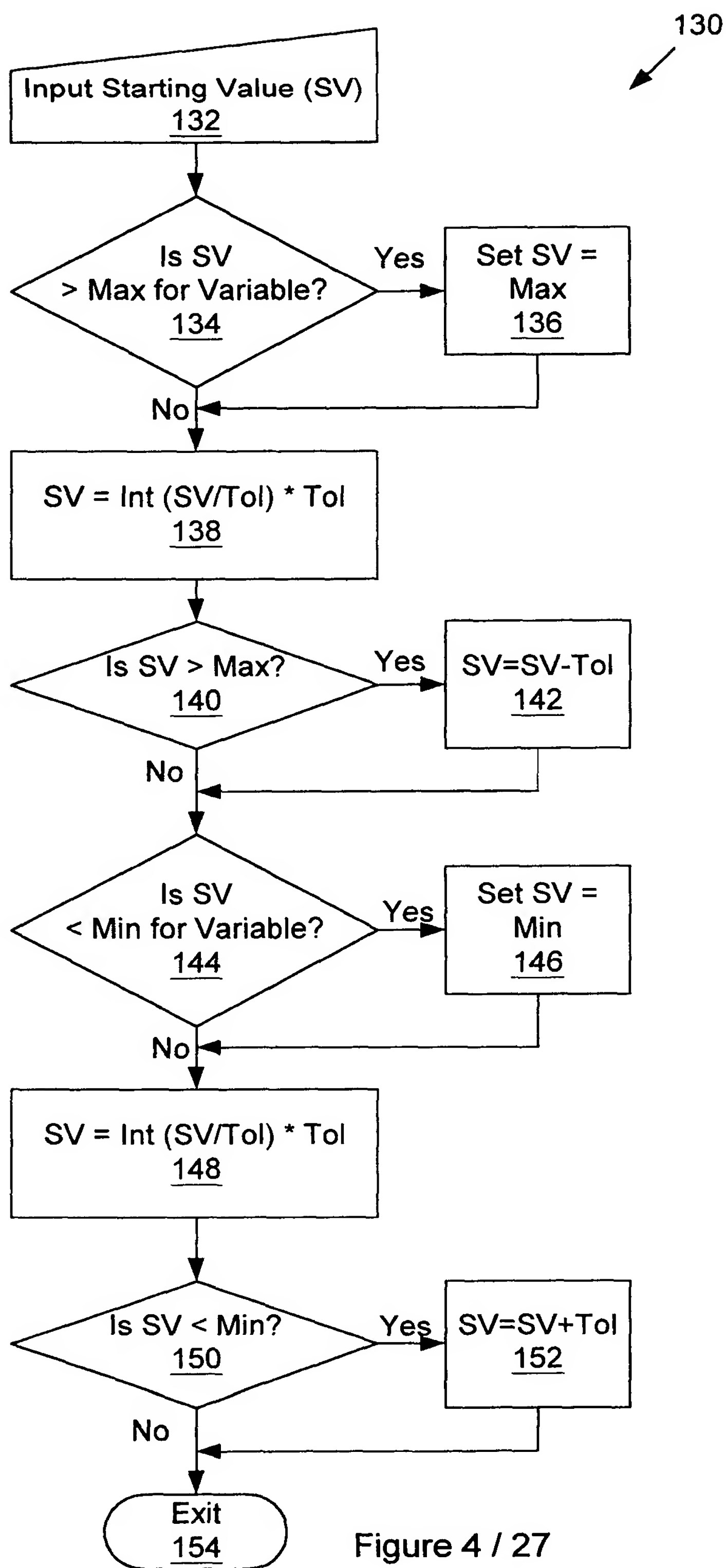


Figure 3 / 27

Tolerance Method



Exploration

112

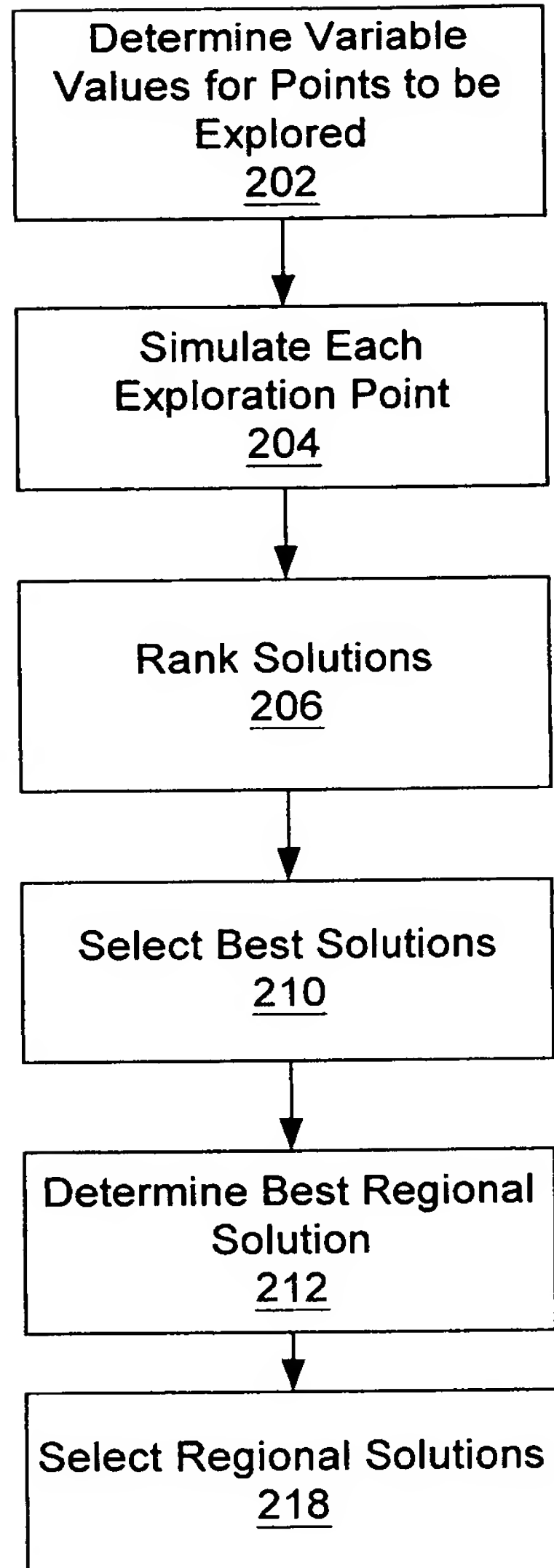


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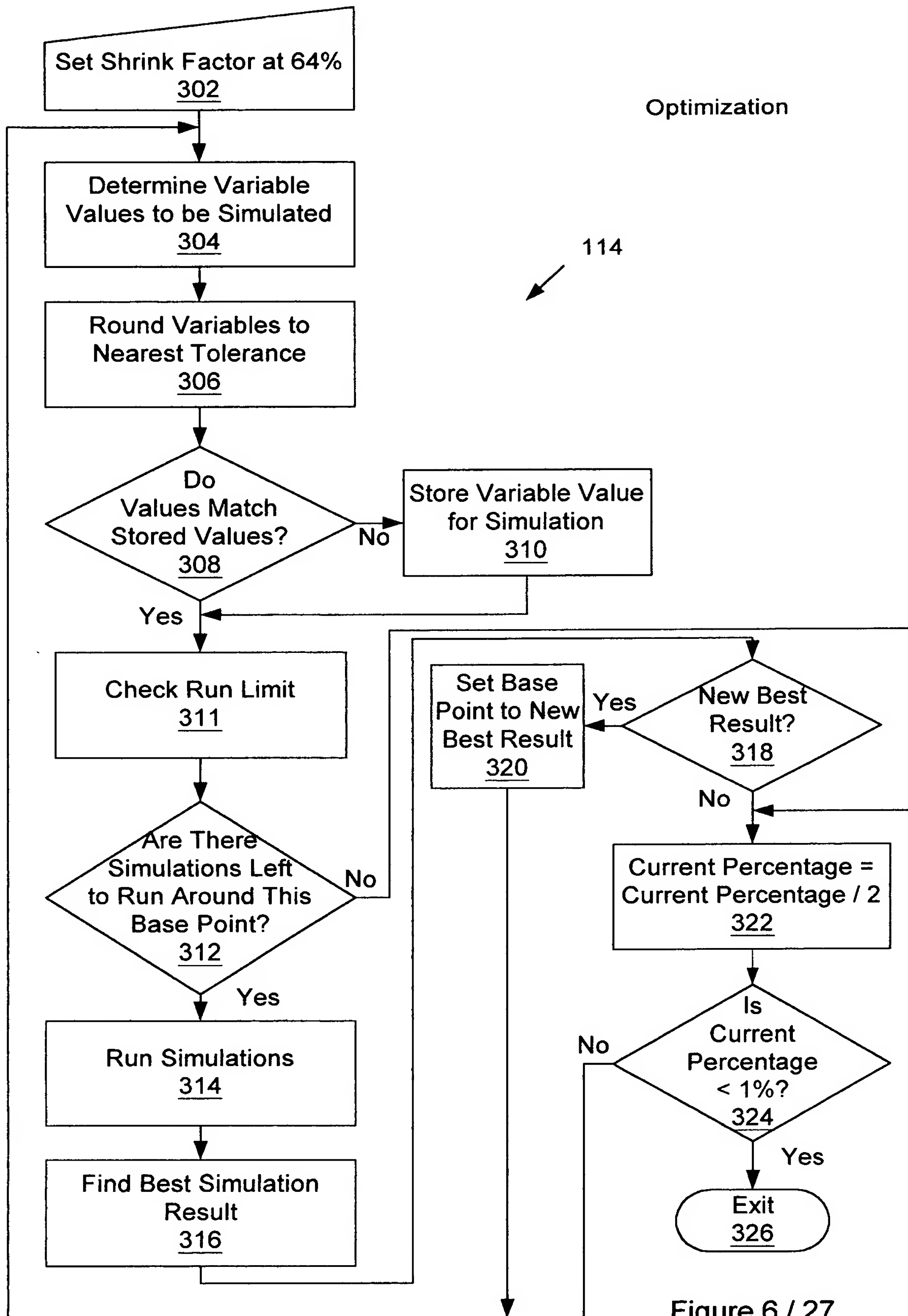


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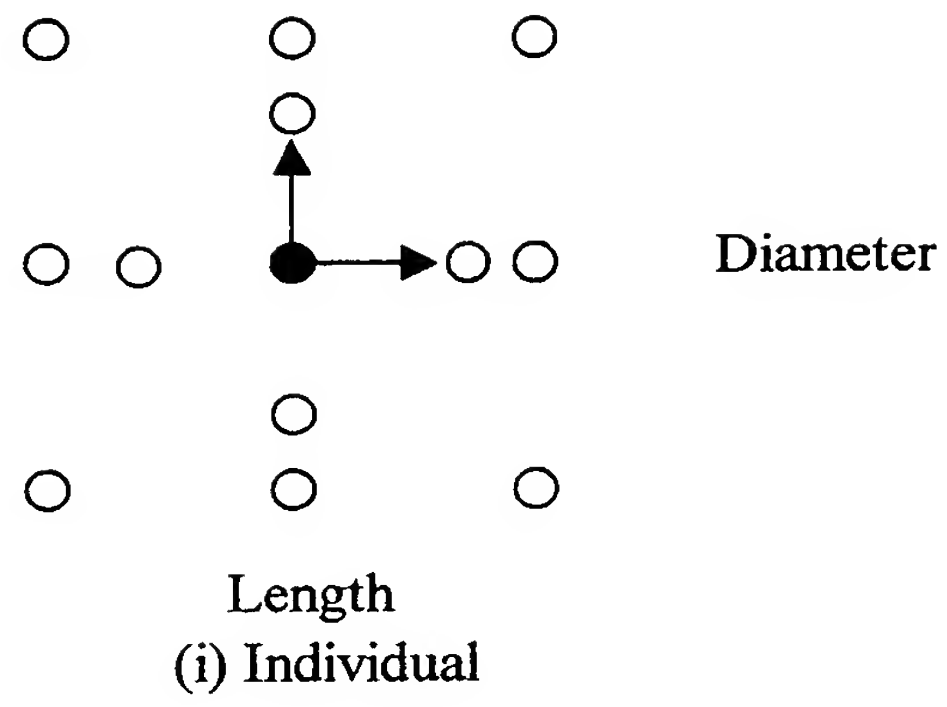


Figure 7a / 27

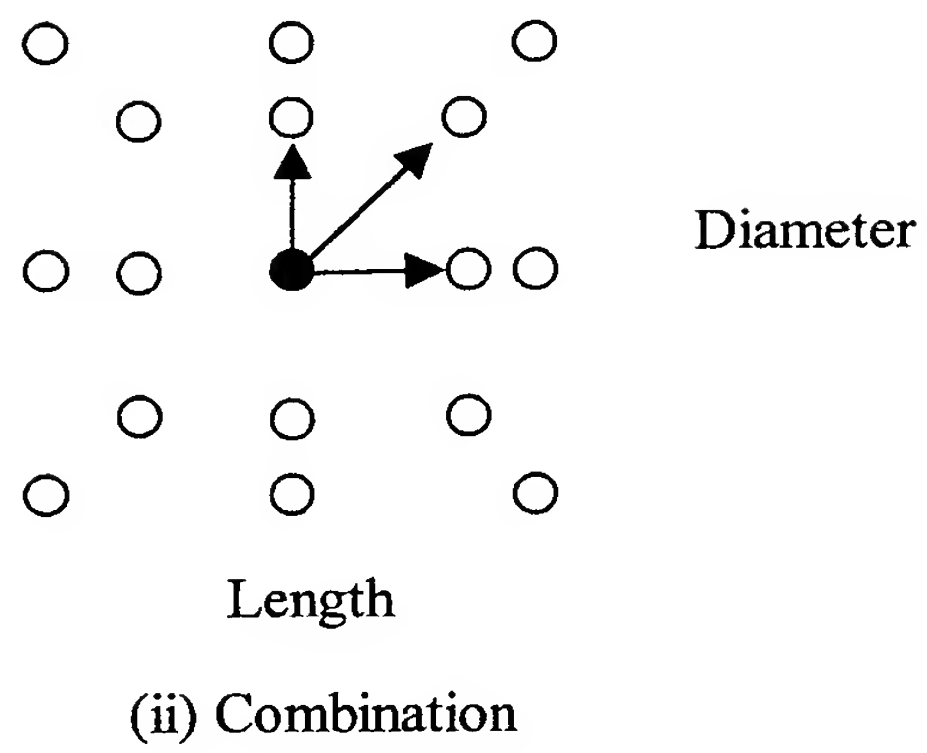


Figure 7b / 27

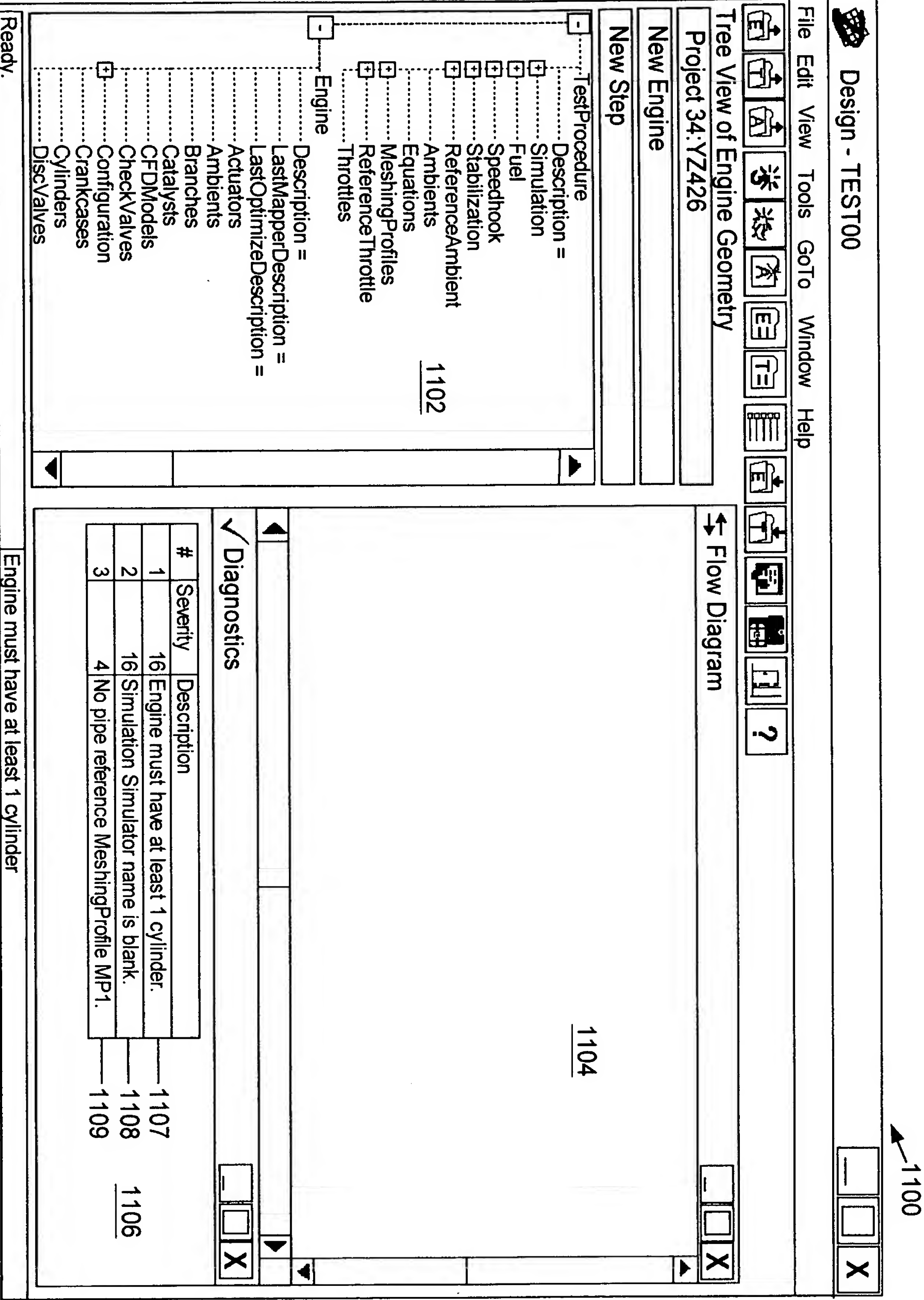


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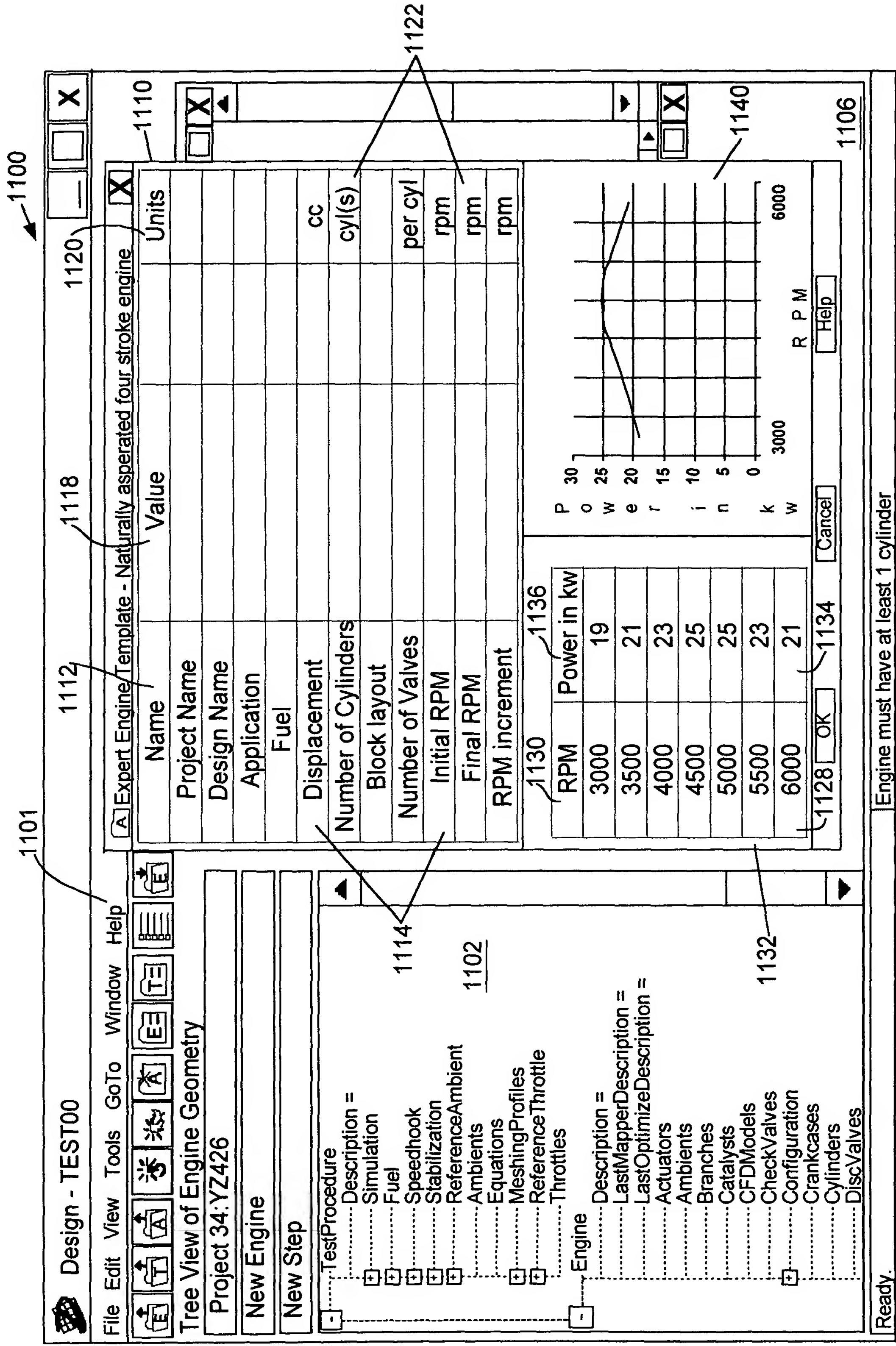


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Design - TEST00

File Edit View Tools GoTo Window Help

Tree View of Engine Geometry

Project 34:YZ426

New Engine

New Step

TestProcedure

Description =

Simulation

Fuel

Speedhook

Stabilization

ReferenceAmbient

Ambients

Equations

MeshingProfiles

ReferenceThrottle

Throttles

Engine

Description =

LastMapperDescription =

LastOptimizeDescription =

Actuators

Ambients

Branches

Catalysts

CFDModels

CheckValves

Configuration

Crankcases

Cylinders

DiscValves

Expert Engine Template - Naturally asperated four stroke engine

Name	Value	Units
Project Name	Current Project...	
Design Name	New Naturally Asperated Clean	
Application	Racer	
Fuel	Gasoline	
Displacement	150	cc
Number of Cylinders	1 cylinder	cyl(s)
Block layout	Inline	
Number of Valves	2 Valves	per cyl
Initial RPM	3000	rpm
Final RPM	6000	rpm
RPM increment	500	rpm

1130

RPM	Power in kw
3000	19
3500	21
4000	23
4500	25
5000	25
5500	23
6000	21

1128 OK 1134 Cancel

1136

Power in kw

3000 3500 4000 4500 5000 5500 6000

R P M

30 25 20 15 10 5 0

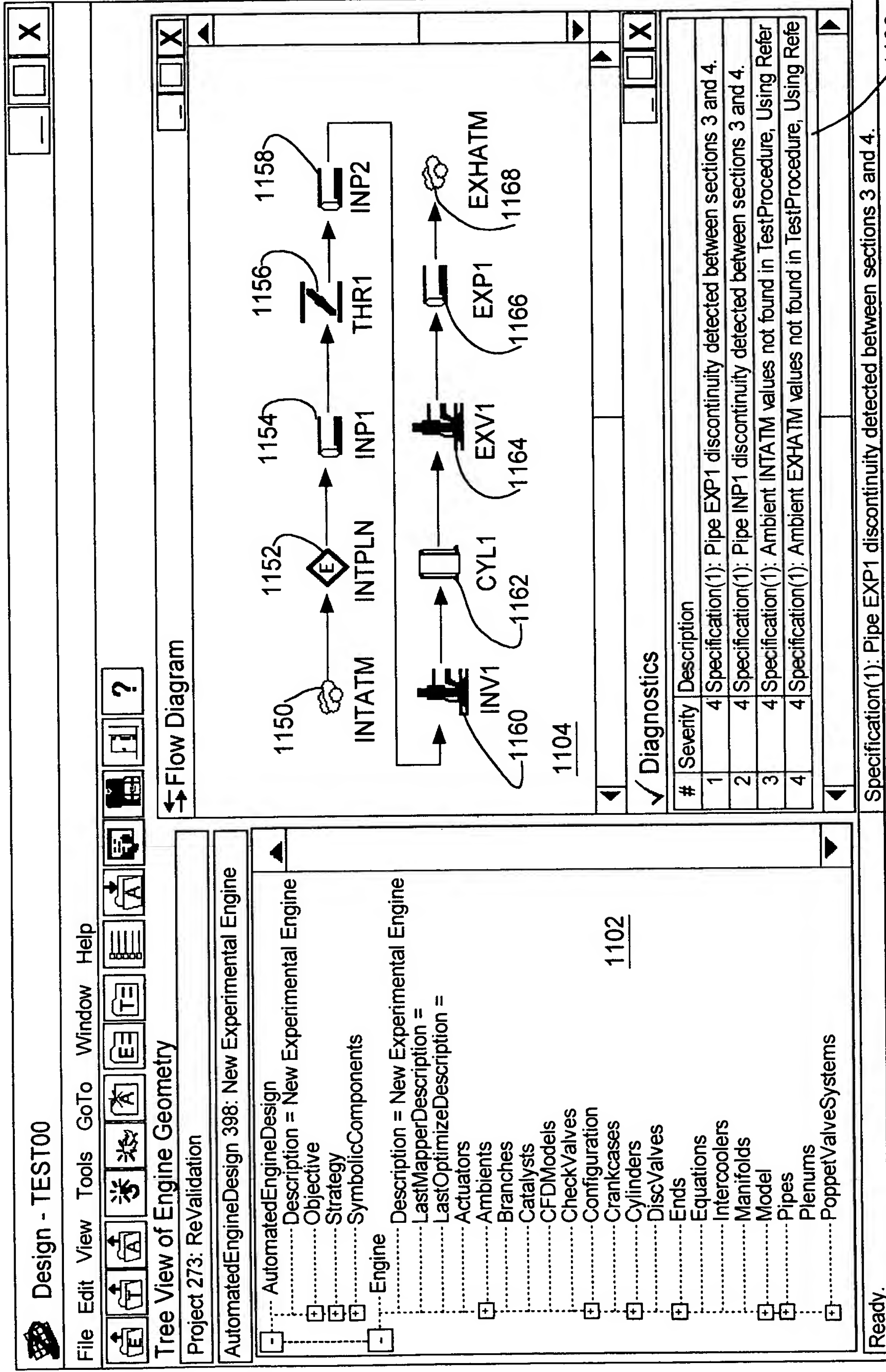
1140

1112 1118 1120 1110 1116 1122 1106

Ready.

Engine must have at least 1 cylinder

Figure 10 / 27



7106

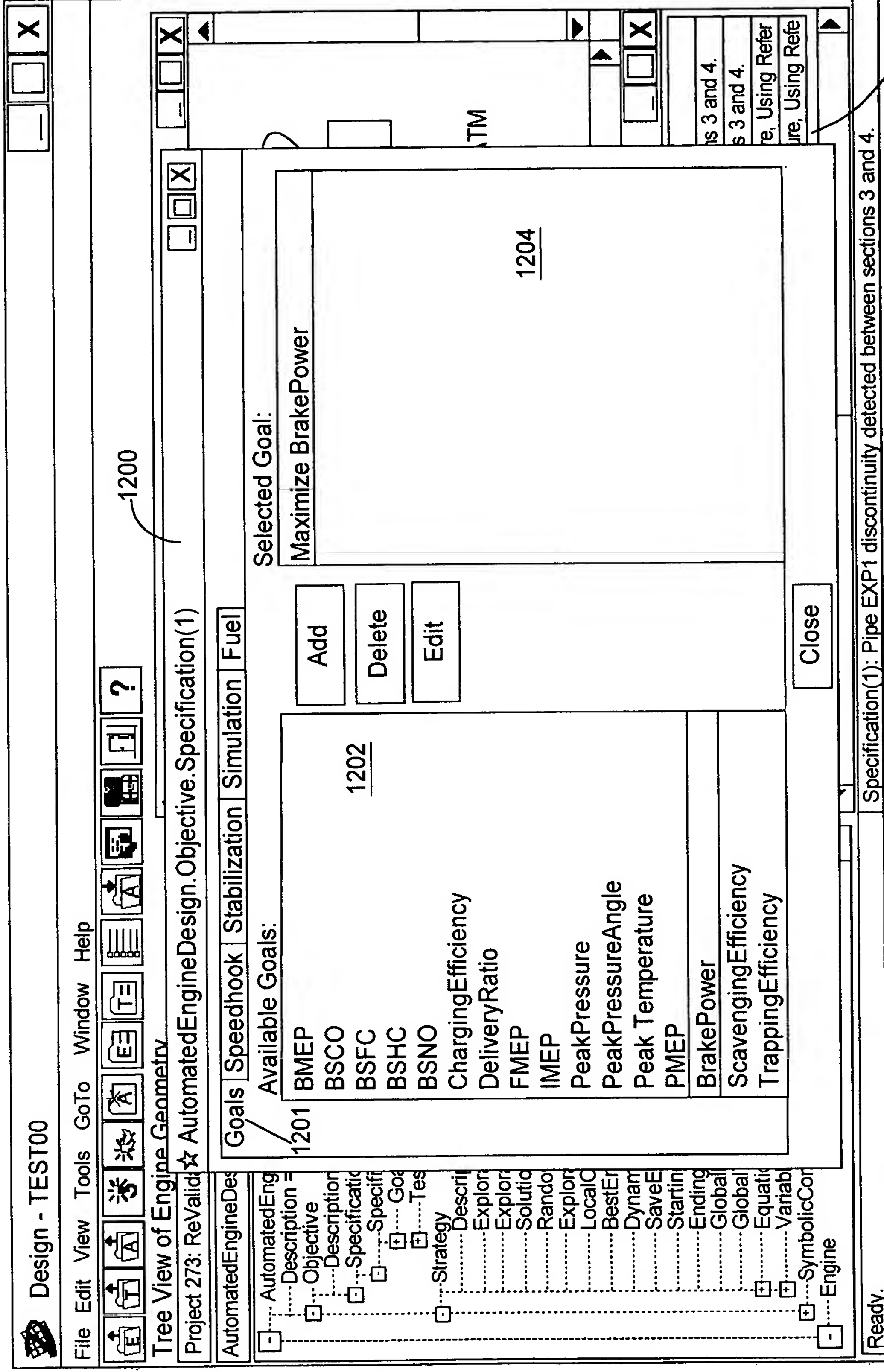


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1100

Design - TEST00

File Edit View Tools GoTo Window Help

Tree View of Engine Geometry

Project 273: ReValid☆ AutomatedEngineDesign.Objective.Specification(1)

AutomatedEngineDes

AutomatedEng

Description =

Objective

Description

Specification

Specification

Goal

Test

Strategy

Description

Explor

Explor

Solutio

Rando

Explor

LocalC

BestEr

Dynam

SaveE

Startin

Ending

Global

Global

Equatio

Variable

SymbolicCor

Engine

Goals Speedhook Stabilization Simulation Fuel

Available Goals:

1201

BMEP

BSCO

BSFC

BSHC

BSNO

ChargingEfficiency

DeliveryRatio

FMEP

IMEP

PeakPressure

PeakPressureAngle

Peak Temperature

PMEP

BrakePower

ScavengingEfficiency

TrappingEfficiency

Add

Delete

Edit

1202

Close

Selected Goal:

Maximize BrakePower

1210

1204

☆ Goal Settings

Name	Value
Goal name	BrakePower
Goal type	Maximize
Goal cost	1.0000

1212

1214

1216

OK

Reset

Cancel

Help

Ready.

Specification(1): Pipe EXP1 discontinuity detected between sections 3 and 4.

1106

Figure 13 / 27

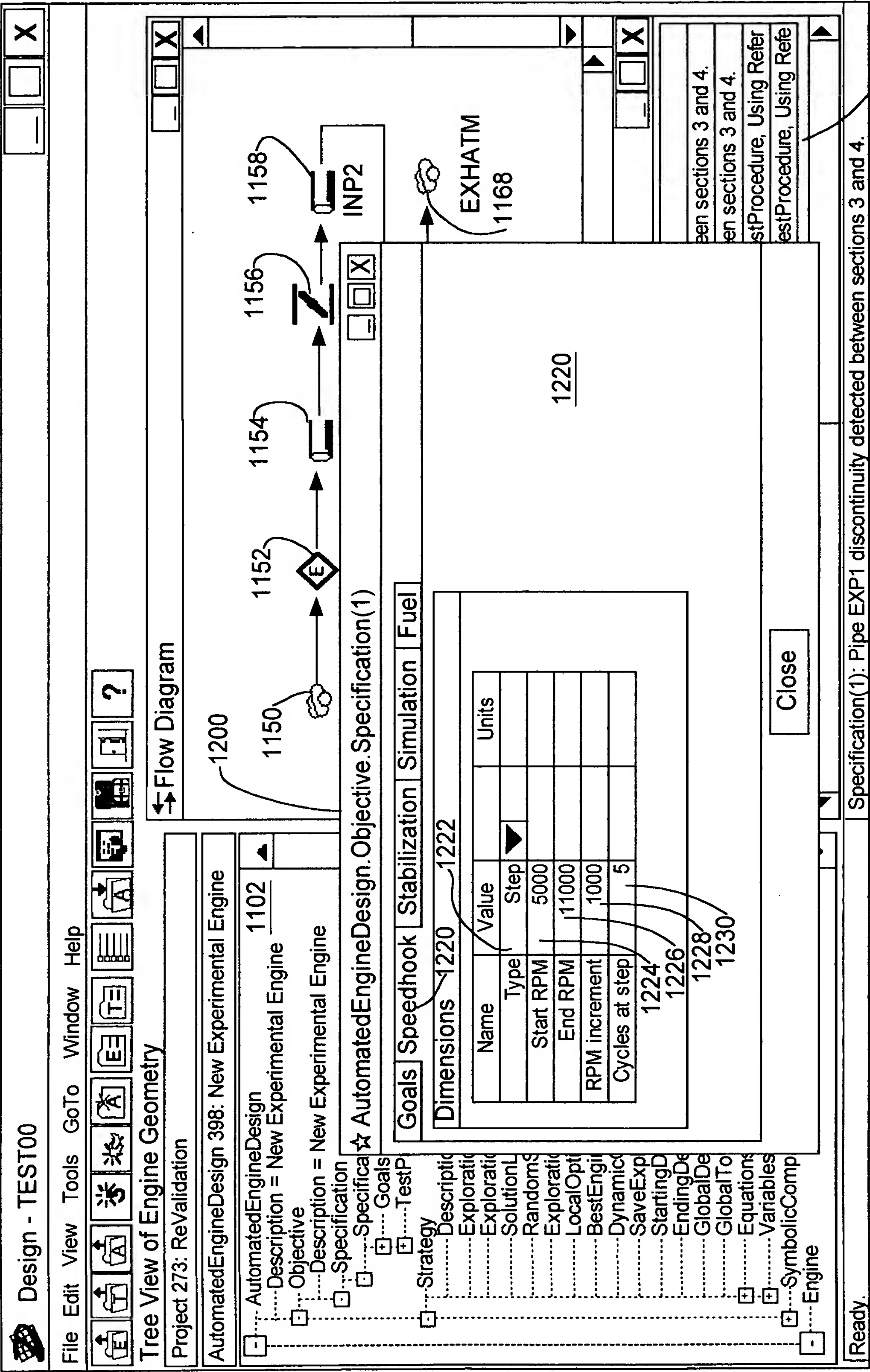


Figure 14 / 27

1100

Design - TEST00

File Edit View Tools GoTo Window Help

Tree View of Engine Geometry

Project 273: ReValidation

AutomatedEngineDesign 398: New Experimental Engine

AutomatedEngineDesign 1102

Description = New Experimental Engine

Objective

Description = New Experimental Engine

Specification

Specification(1)

Goals

TestProcedure

Strategy

Description

Exploration

Exploration

SolutionLi

RandomS

Exploration

LocalOptim

BestEngine

DynamicO

SaveExpl

StartingDe

EndingDe

GlobalDel

GlobalTol

Equations

Variables

SymbolicComp

Engine

Flow Diagram

1200

1150

1152

1154

1156

1158

INP2

EXHATM 1168

1220

1240

Goals Speedhook Stabilization Simulation Fuel

Name	Value	Units
Difference	0.01	atm
Long slope	0.01	
Long Count	10	Cycles
Short slope	0.01	
Short count	5	Cycles
Maximum revolutions	99	Cycles
Stabilization value	BMEP	

Close

Ready.

Specification(1): Pipe EXP1 discontinuity detected between sections 3 and 4.

1106

Figure 15 / 27

1100

Design - TEST00

File Edit View Tools GoTo Window Help

Tree View of Engine Geometry

Project 273: ReValidation

AutomatedEngineDesign 398: New Experimental Engine

AutomatedEngineDesign 1102

Description = New Experimental Engine

Objective

Description = New Experimental Engine

Specification

Specification

Goals

TestP

Strategy

Descriptive

Explorative

Explorative

SolutionL

Randoms

Explorative

LocalOpt

BestEngi

Dynamic

SaveExp

StartingD

EndingDe

GlobalDe

GlobalTo

Equations

Variables

SymbolicComp

Engine

Flow Diagram

1200

1150

1152

1154

1156

1158

EXP2

EXHATM

1168

Goals Speedhook Stabilization Simulation Fuel

Dimensions

Name	Value	Units
Simulator name	SIMLEV6A	1272
Fired/Motored	Fired	1274

Close

Ready.

Specification(1): Pipe EXP1 discontinuity detected between sections 3 and 4.

1106

Figure 16 / 27

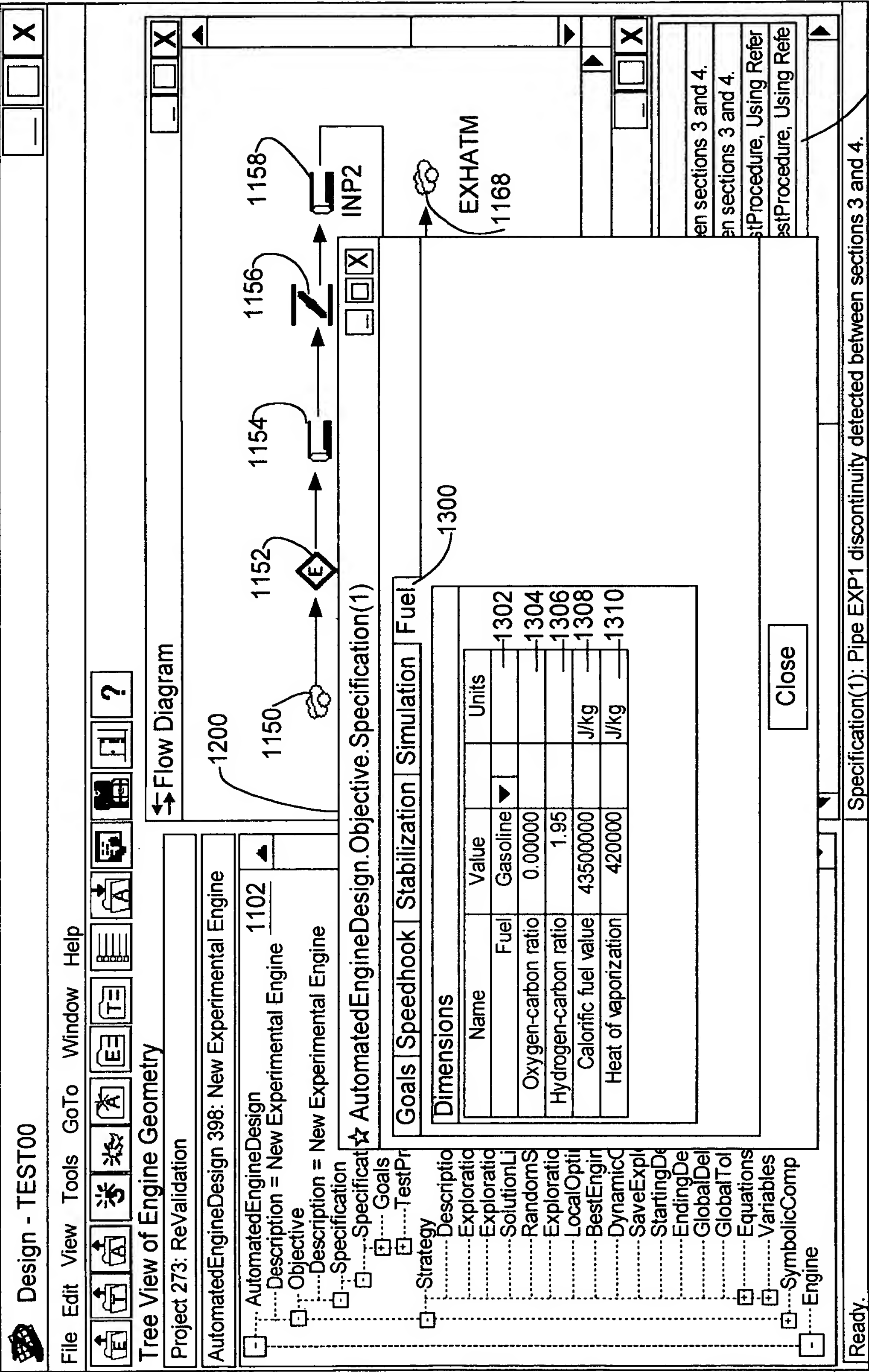


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Design - TEST00

File Edit View Tools GoTo Window Help

Tree View of Engine Geometry

Project 2720: Design Validation

AutomatedEngineDesign.Strategy

Variables Constraints Inference Engine

Tree Views of All Variables: 1380

Engine

Cylinders

Ends

Pipes

PoppetValveSystems

1322

1324

Add=>

Remove

25 Engines maximum in the Exploration

8 Engines maximum in each Solution

Flow Diagram

1320

1328 1330 1332 1334 1336 1338

Selected Variables:

Name	Minimu...	Current...	Maxim...	Tolera...	Units
EXP1.S[4].ExitDIA	20.0	38.0	100.0	5.0	mm
EXP1.S[4].Len	75.0	915.0	1000.0	25.0	mm

1327

1329

1326

Combine

Seperate

Edit

Move Up

Move Down

Close

Ready.

Specification(1): Pipe EXP1 discontinuity detected between sections 3 and 4.

Figure 18 / 27

←1100

Design - TEST00

File Edit View Tools GoTo Window Help

Tree View of Engine Geometry

Project 2Automate

AutomatedEngineDesign.Strategy

Variables Constraints Inference Engine

Tree Views of All Variables: 1380 1327

Engine

+ Cylinders

+ Ends

+ Pipes

+ PoppetValveSystems

1322

1324

Add=>

Remove

25 Engines maximum in the Exploration

8 Engines maximum in each Solution

1364

1354

1356

1358

1360

1362

1326

EXP1.S[4].ExitDIA

EXP1

Optimize Variable Settings

1366

1368

1352

1350

1370

Value

Minimum

Current

Maximum

75.0

915.0

1000.0

mm

mm

mm

mm

-840.0

+85.0

+9.29

-91.8

Absolute Value

Absolute Value

OK

Cancel

Help

Move Up

Move Down

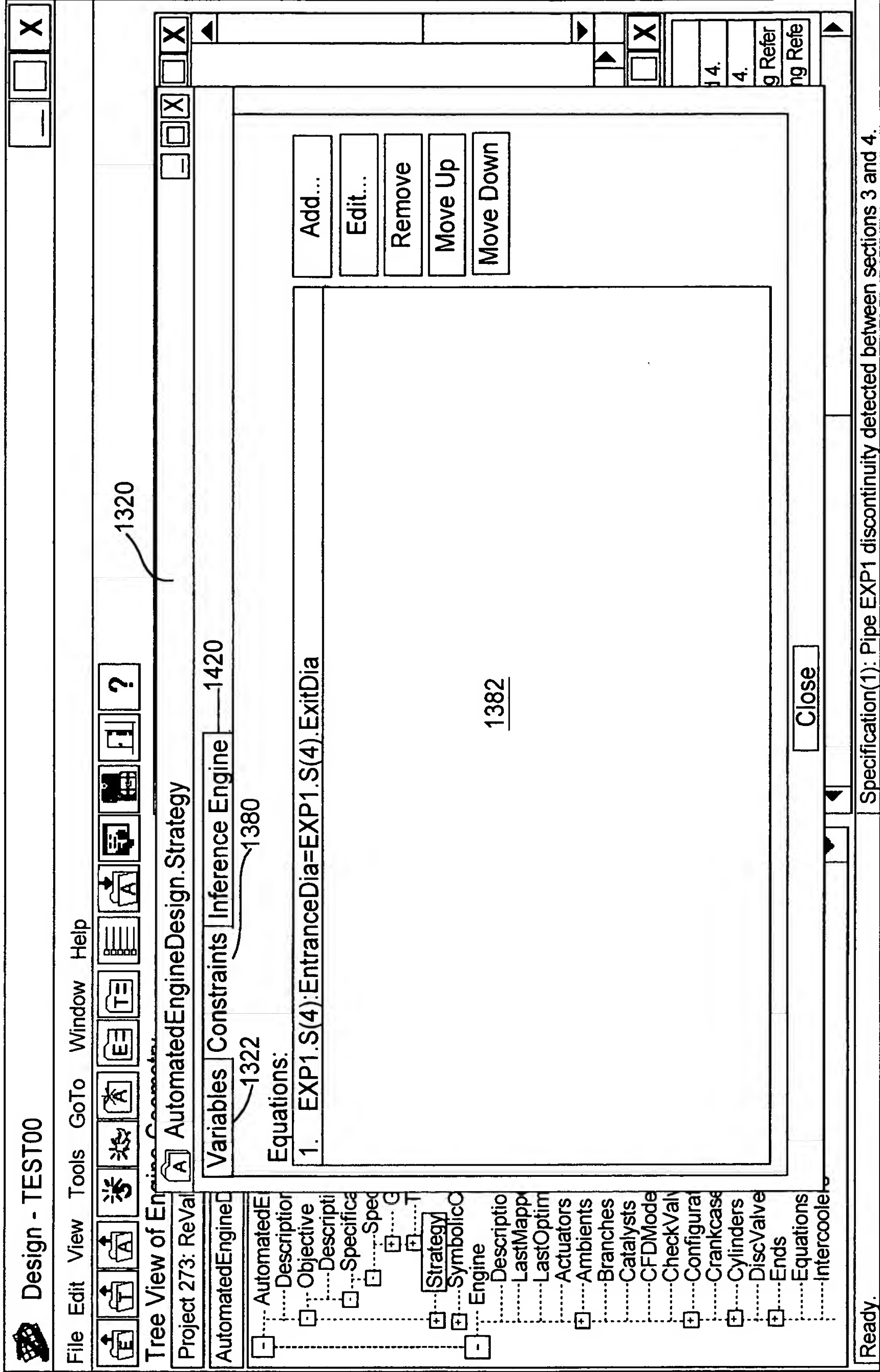
Close

Ready.

Specification(1): Pipe EXP1 discontinuity detected between sections 3 and 4.

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Specification(1): Pipe EXP1 discontinuity detected between sections 3 and 4.

Figure 20 / 27

←1100

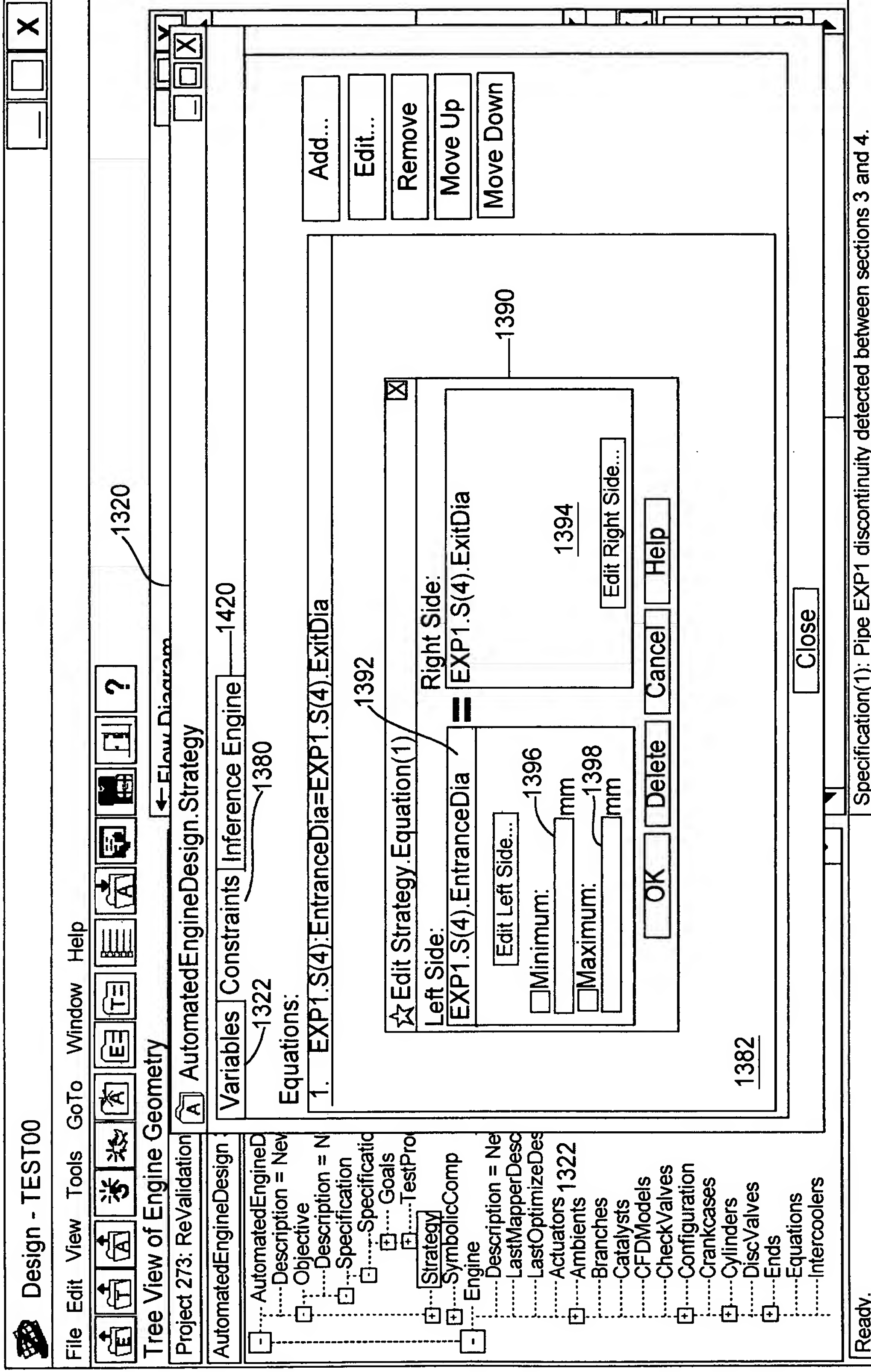


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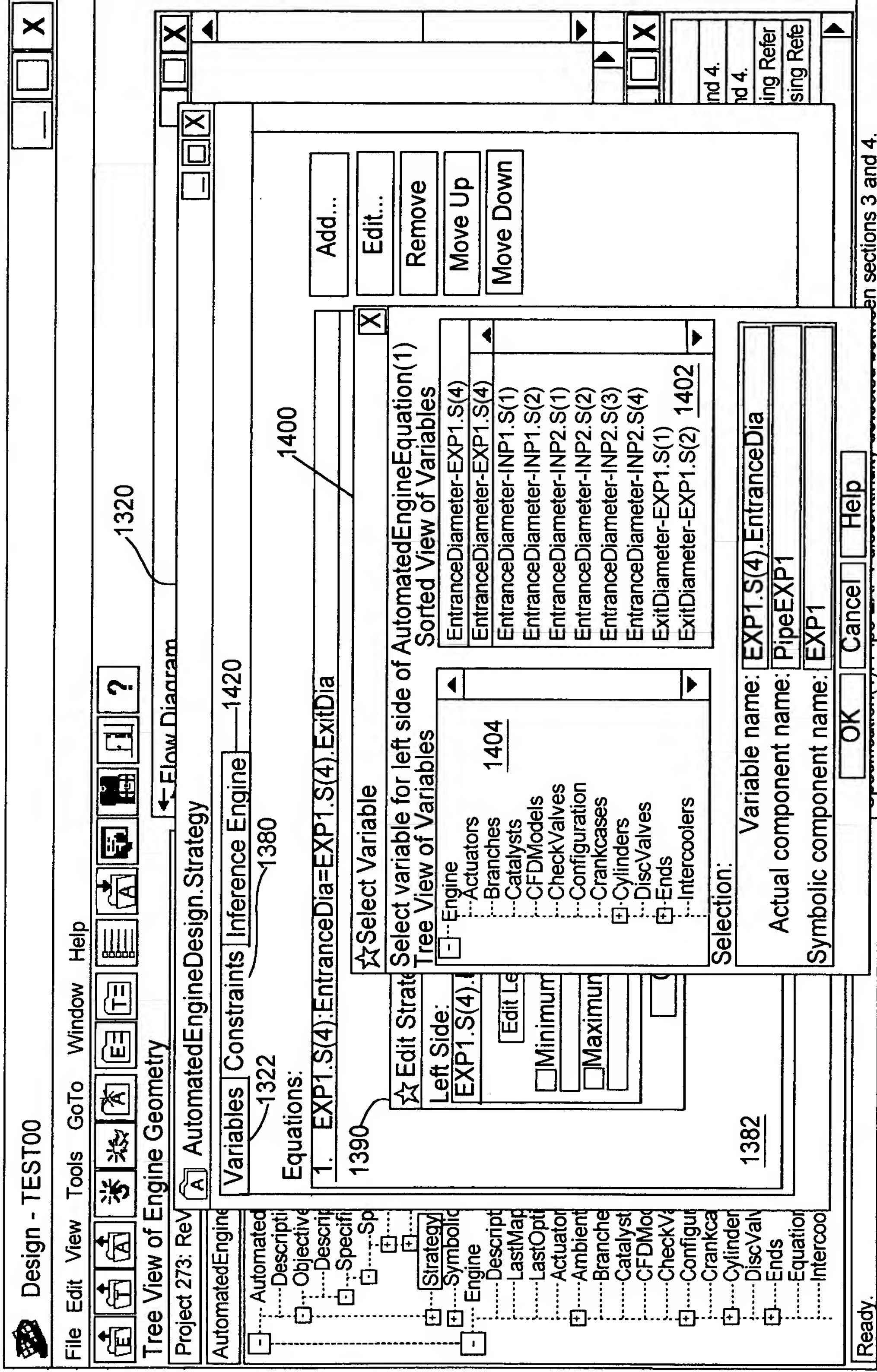


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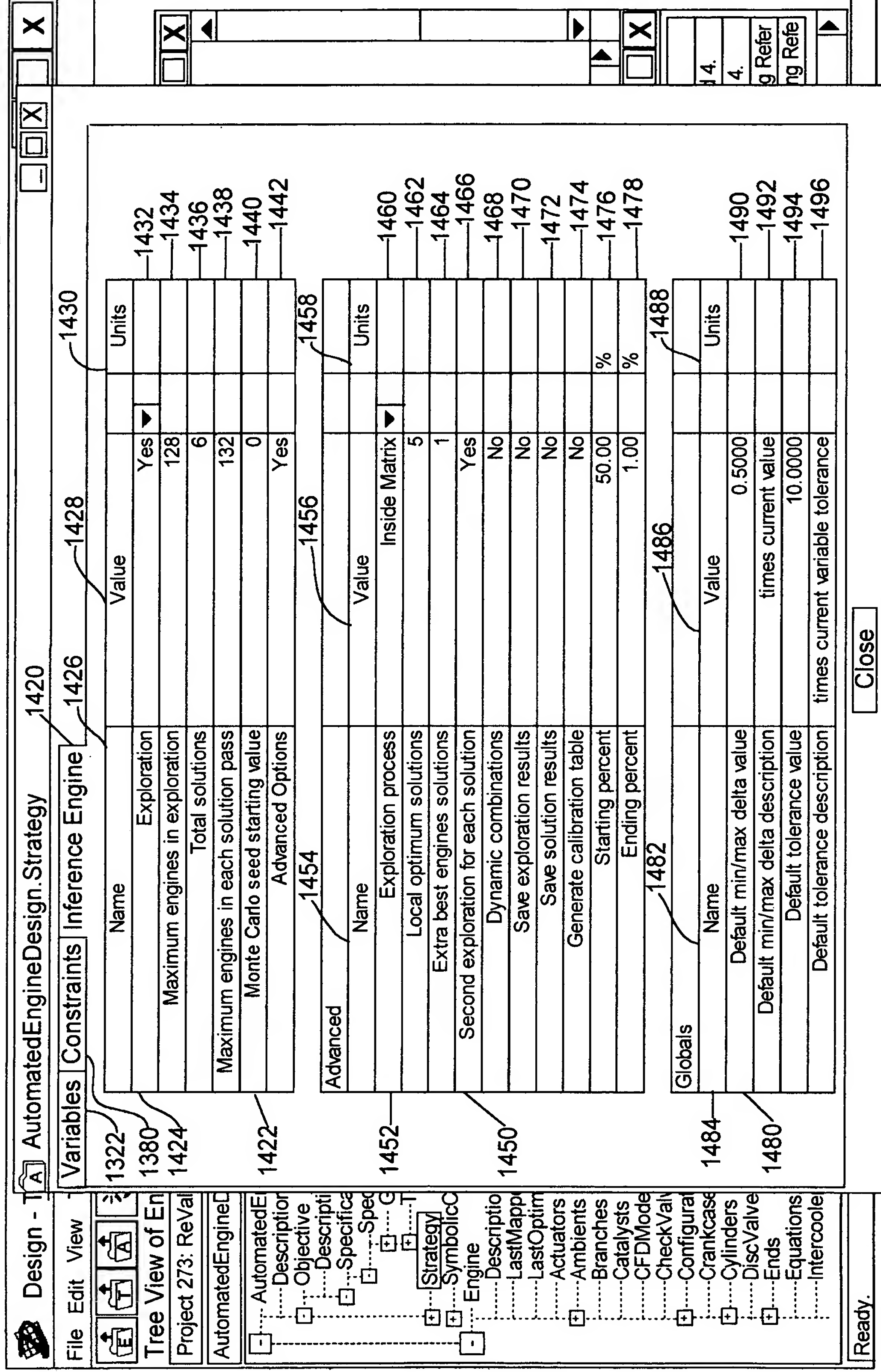


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Design - TEST00

File Edit View Tools GoTo Window Help

Tree View of AutomatedEngineDesign

Project 273: ReValidation

AutomatedEngineDesign 398: New Experimental Engine

AutomatedEngineDesign

Description = New Experiment

Objective

Description = New Experiment

Specification

Specification(1)

Goals

TestProcedure

Strategy

SymbolicComp

Engine

Description = New Experiment

LastMapperDescription =

LastOptimizeDescription =

Actuators 1322

Ambients

Branches

Catalysts

CFDModels

CheckValves

Configuration

Crankcases

Cylinders

DiscValves

Ends

Equations

Intercoolers

Flow Diagram

Symbolic Component Resolution

Component

Pipe

Symbolic Name

Exhaust Runner

Actual Name

EXP1

Close

1502

1504

1506

1158

P2

KHATM

1500

Ready.

Specification(1): Pipe EXP1 discontinuity detected between sections 3 and 4.

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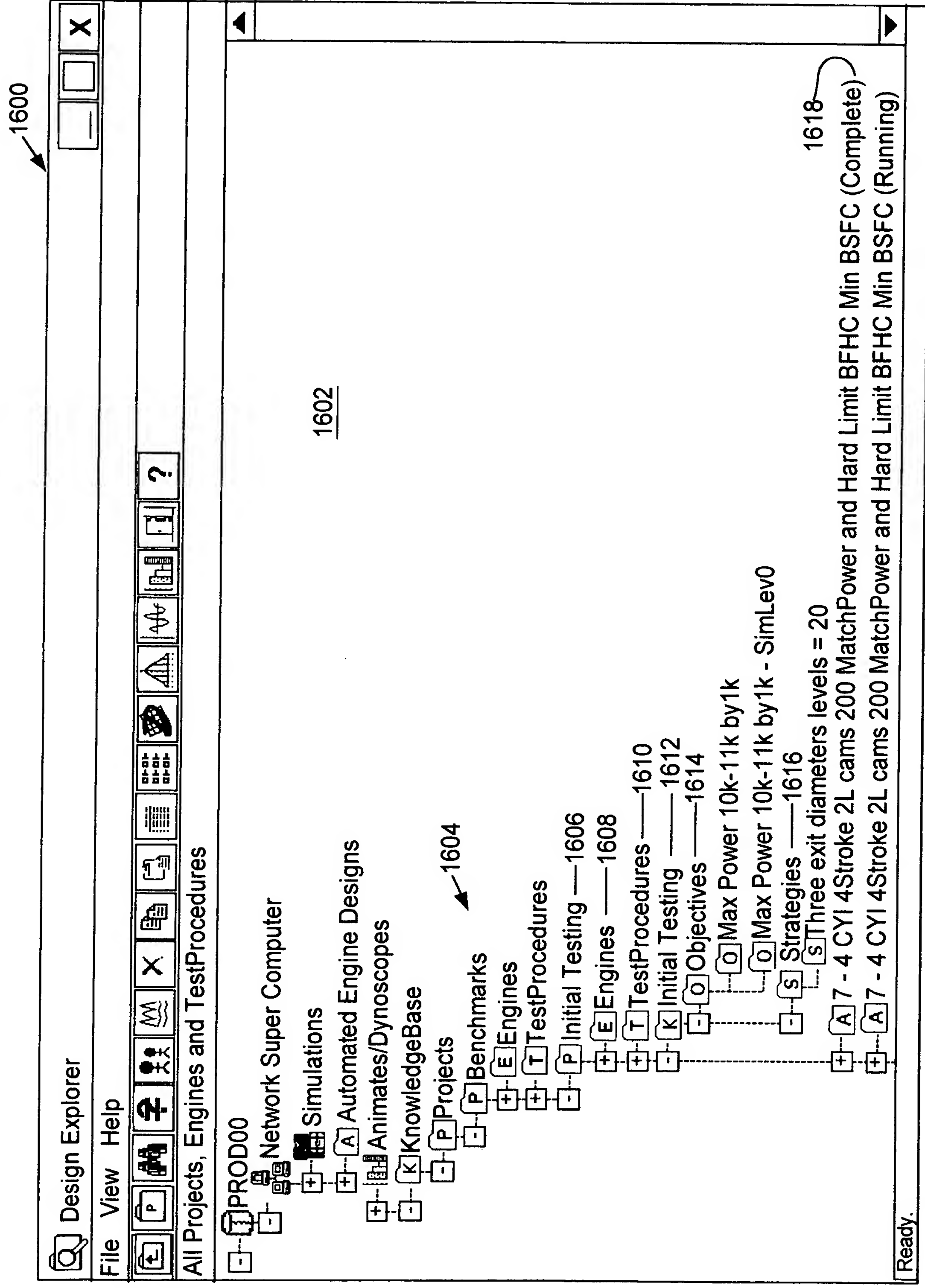


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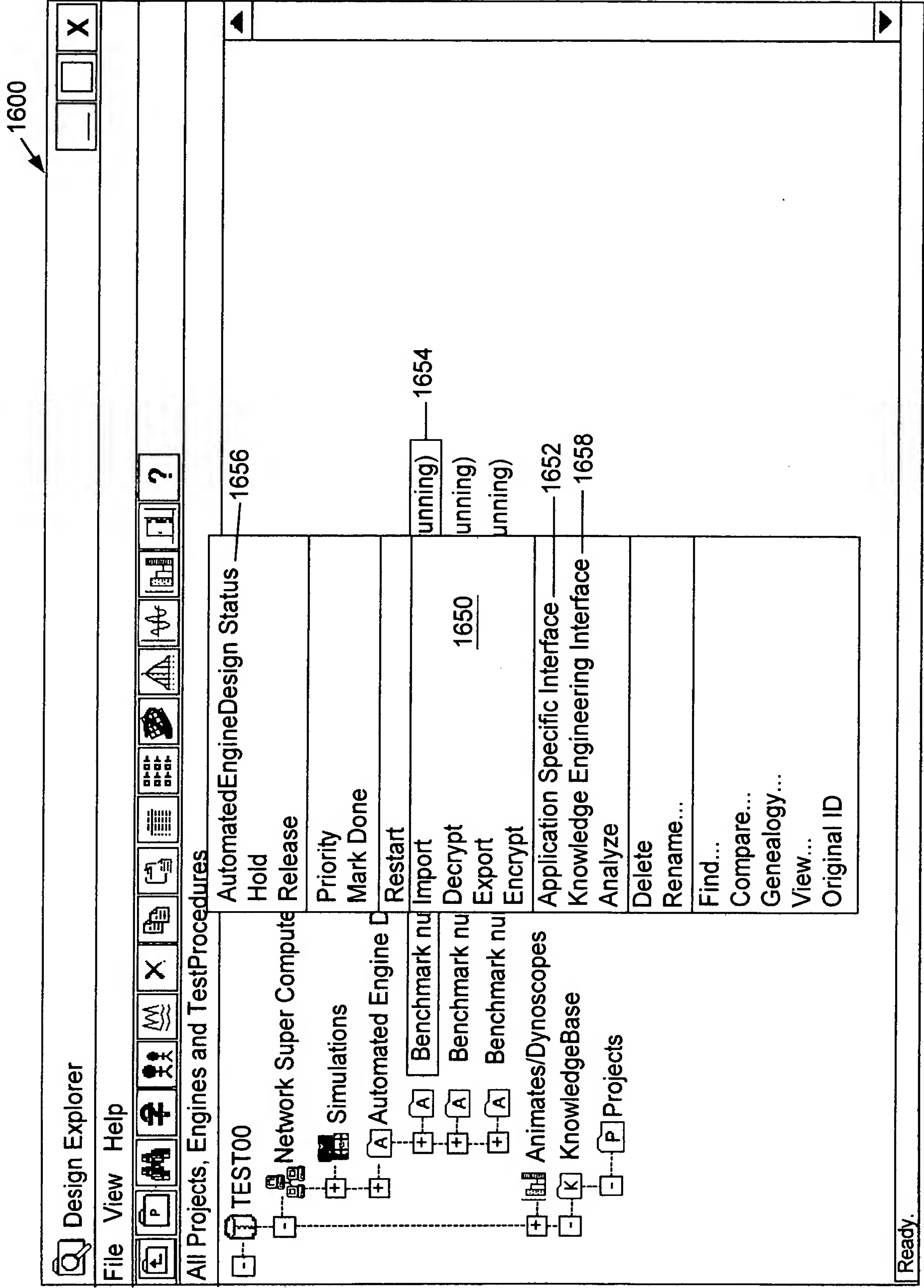


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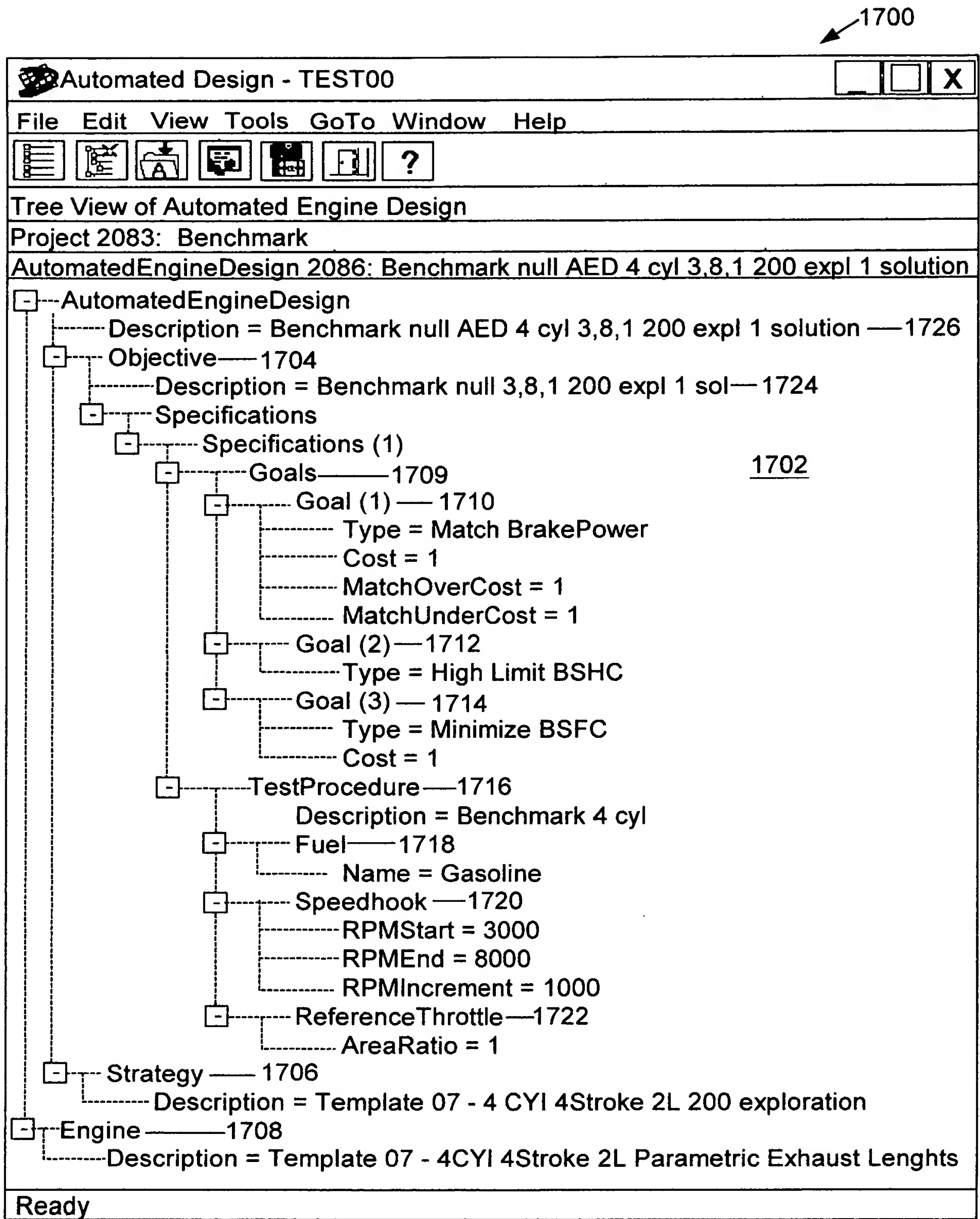


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